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FISHERIES SURVEY OF CENTER LAKE, OSCEOLA COUNTY

by

C. J. D. Brown and Hugo Kilpela

Introduction

Location and Drainage

Center Lake is a small, public lake of considerable importance. It is located in the northern part of Osceola County (T. 20 N., R. 9 W., Secs. 21, 22) approximately 10 miles south of Cadillac and 2 miles east of Highway U.S. 131. The lake is accessible only by a short piece of newly-made dirt road which leads off from a farm road about 5 miles east of the town of Tustin.

This lake has no inlet nor outlet and is therefore not an active part of any drainage system. It lies within the drainage area of the Manistee River, however.

Acknowledgments

The map of Center Lake was prepared by a regular Institute mapping party* in March of 1942. This was used for plotting stations, vegetation beds, etc., by the fisheries survey party** which made a regular biological inventory July 16-18, 1942. Conservation Officer W. C. Kidder furnished the party with considerable information on the past and present use of this lake.

Past and Present Use

Center Lake apparently had no importance as a public water until the tax payers of Sherman Township purchased frontage and completed a road to the lake shore. Now that a park has been developed, the lake has considerable use by people coming from miles around to enjoy swimming, picnicing, and fishing. Bass fishing has been fair according to reports but the perch,

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* The mapping party included: Robert Matthews, leader; P. Scears and James Oliver, assistants.

** The fisheries survey party included: Hugo Kilpela, leader; R. D. Van Deusen, Pat Galvin and Stanley Lievense, assistants.

bluegills, and sunfish are all small--mostly sublegal. Any improvement in fishing would serve many local people.

Physical Characteristics

Geological Origin

Center Lake is of the pothole type and quite certainly originated from a block of ice buried in a glacial moraine. It is situated at an elevation of approximately 1,300 feet above sea level in hilly moraine characteristic of the district.

Shape of Basin and Extent of Drainage

The basin of Center Lake is rather irregular in outline. One prominent embayment extends directly south from the major portion of the lake and another broad bay exists on the northeast. The drainage of the lake is limited to that of the immediately surrounding terrain. There are no tributaries and no visible springs.

The surrounding country is hilly and mostly under cultivation. The soil is sandy and of a poor quality. A considerable quantity of second growth of poplar, paper birch, and scattered evergreens are found in the vicinity immediately surrounding the lake.

Water Fluctuation

Water fluctuations are so slight in Center Lake that they are not significant to fisheries.

Other Physical Characteristics

Center Lake has an area of approximately 40 acres and a maximum depth of 39 feet which may be found in the south central part of the main body of the lake. A small depression in the south bay is 19 feet deep and a marked depression in the northeast bay is 34 feet deep. There is no sharp drop-off but the bottom slopes away fairly fast right from shore. The shoreline is regular with a development of 1.4. This means that the shoreline is 1.4 times longer than it would be if the lake was perfectly round. In three places there is an encroaching bog mat. This is most highly developed along the shores of the south bay.

The lake bottom in the shallow areas (out to about the 10-foot contour) is mostly sand with considerable quantities of superimposed debris of one kind or another. This is mostly decaying wood, leaves, etc. Beyond the 10-foot contour the lake bottom is almost exclusively of pulpy peat.

The water of Center Lake is almost entirely without color. It had a transparency of 18 feet (Secchi disc) which is about twice as great as the average for Southern Michigan lakes.

The physical factors operating in Center Lake are for the most part favorable to fish production. The presence of a goodly amount of solid

bottom, clear water and stable water level are evidence for this. However, these physical factors alone are only part of the picture. Chemical and biological factors must also be favorable in order to have maximum fish production.

Temperature and Chemical Characteristics

A temperature series taken from top to bottom in Center Lake on the date (7/17/42) of the survey showed the presence of a thermocline (zone of rapid change in temperature). This zone extended from the 12-foot to the 30-foot level. The water temperature was 75°F. at the surface, 74°F. at the top of the thermocline and 48°F. at the bottom of the thermocline. The temperature just off the bottom (36 feet) was 47°F.

Oxygen analyses made on water samples from various depths gave results as follows: 7.2 p.p.m. at surface, 7.5 p.p.m. at the top of the thermocline, 4.8 p.p.m. at the bottom of the thermocline and 0.9 p.p.m. at the bottom.

The water in this lake was slightly acid (pH 6.8) and extremely soft (Methyl orange alkalinity 2.0 p.p.m.). As a matter of fact, we believe this alkalinity figure is the lowest recorded for any lake yet given a regular fisheries survey in Michigan.

Temperature conditions in Center Lake are certainly more favorable to cold water fish than to warm water ones such as largemouth bass and bluegills. The zone of water between 12 and 30 feet, which constitutes a considerable volume of the lake, has sufficient oxygen and suitable temperatures for trout the year around. The low alkalinity and slightly acid water are the primary restricting factors in the growth of aquatic plants and, consequently, fish-food. These factors strictly limit fish production and the lake in its present state will never be able to carry many fish.

Biological Characteristics

Aquatic Vegetation

Aquatic vegetation was very sparse in the lake. The limited shallow water areas, acidity of the water and lack of carbonates are the restricting factors. Only 6 species of plants were found. They are listed below along with estimates of their abundance.

Common name	Scientific name	Abundance
Three-way sedge	(Dulichium arundinaceum)	Sparse
Spike rush	(Eleocharis calva)	Sparse
Pipewort	(Eriocaulon septangulare)	Sparse
Soft rush	(Juncus effusus)	Sparse
Yellow water lily	(Nuphar variegatum)	Common
Cattail	(Typha latifolia)	Sparse

The yellow water lily is the only plant which could be considered as common. About one-fifth of the shoreline is encroaching. The immediate shore cover is leather leaf, bog rosemary, water cinquefoil and cranberry. These are further evidence of the acid nature of the water and surrounding mat.

Fish-foods

The sparsity of vegetation is the main restricting factor of fish-foods in the lake. The bulk of the fish-food organisms secure food and cover in the so-called weed beds.

Plankton (the microscopic, free-floating plants and animals) was fairly abundant. Its main composition was of zoo- or animal-plankters. This is somewhat indicative of the favorableness of Center Lake for the young of game fishes and for minnows.

In general, the food conditions on the lake bottom are very poor. Midge larvae, dragonfly and damselfly nymphs, and aquatic earthworms were the only organisms found.

Green frogs and their tadpoles were fairly numerous in the shallow water near the shore. There are no forage fish in the lake.

Except for the plankton, which is probably fairly abundant in Center Lake, the fish-food conditions are very poor. This is to be expected in water of acid and low carbonate content. Any increase in the plant beds would almost surely increase fish-foods and, consequently, fish.

Fish Present

Five species of game fish were collected by the survey party. No forage, coarse or obnoxious fish were found to be present, although carp was reported as having been present at one time.

The game fish are listed below in the order of abundance and the stocking of each species is indicated.

Species	Stocking, 1934-1941 inclusive
Pumpkinseed x Bluegill (Hybrids)	...
Pumpkinseeds	None
Bluegills	45,000 (3 mo. old)
Perch	None
Largemouth bass	200 (3 mo. old)
Rock bass	None

1/ No fish were planted from 1933 through 1937.

The abundance of a large number of hybrid bluegills x pumpkinseeds was recorded.

Creel Census

There are no creel census records for this lake.

Growth Rate of Game Fish

Scale samples were removed from all the game fish collected. These have been studied and the following table gives a summary of the age and size for each age group of each species.

Species	Number of specimens	Age growing seasons	Average total length (inches)
Yellow perch	2	1½	3.9
	2	2½	4.3
	1	3½	5.9
	2	5½	9.6
	1	6½	10.9
	1	7½	12.3
	1	8½	11.1
Largemouth bass	4	1½	3.7
Bluegills	5	1½	3.4
	7	2½	4.4
	1	4½	6.6
Bluegills x Pumpkinseeds (Hybrids)	6	2½	4.9
	5	3½	5.3
	3	4½	5.0
	2	5½	5.7
Pumpkinseeds	1	1½	2.9
	2	2½	3.6
	9	3½	4.3
	3	4½	5.0
	3	5½	5.2
Rock bass	1	5½	10.1

A comparison between the growth rate of the Center Lake fish and the tentative state averages of each species prepared by W. C. Beckman show that in general the fish of this lake are slow growing and below average. The following table is a comparison between the legal length of Center Lake fish and the state averages.

Species	Center Lake, summer of life	State Averages, summer of life
Yellow perch	4	3
Largemouth bass	Inadequate data	
Bluegills	4 or 5	4
Pumpkinseeds	6-8	4
Rock bass	Inadequate data	

Bluegills come the nearest to equalling the state average, although largemouth bass would be expected to reach legal length in about average time. The one rock bass taken was in its 6th summer and was over 10 inches in total length. This is equal to 10-year-old fish based on state averages. There are probably only a very few rock bass in the lake.

Natural Propagation

There were considerable numbers of young-of-the-year largemouth bass, bluegills and pumpkinseeds taken at the time of the survey. This is good evidence of adequate natural propagation. Certainly the conditions for spawning and survival of young in the lake appear to be adequate for all game species present.

Management Proposals

Designation of Lake

The findings of the survey give no valid reasons for a change in designation from the "all other lakes" category.

Stocking

In view of the slow growth of the panfish in Center Lake and the adequate facilities for their natural reproduction, it is recommended that the stocking of all species now present in the lake be discontinued.

We have sufficient evidence, on the other hand, to believe that this lake can carry a limited number of rainbow trout and smallmouth bass. A planting of 500 legal rainbow trout in 1942 and again in 1943 just before the "freeze-up" is suggested. A liberal planting of smallmouth bass preferably as large fingerlings or subadults is also recommended. Spawning facilities are such that only one planting should be necessary to establish the bass. Future checks by the Institute can be used as a basis for future management policies. It is possible that even legal-sized plantings of trout in this lake may fail in the presence of apparently stunted populations of sunfish and that the lake may have to be poisoned and restocked when the poison is again available but we believe that experimental plantings of trout are justified at the present time since more evidence on this point is desired. Also, if rainbow trout thrive, the lake should be designated for fall fishing for this species but this can await the results of the experimental plantings.

Shelter

Although shelter is rather scarce, no improvements are recommended until the success of trout and bass introductions have been ascertained. It is believed that no additional cover is necessary for these species.

Fertilization

This lake should be kept in mind for possible experiments in the addition of lime and perhaps other fertilizers when this can be done.

Predators and Parasites

None seen or reported.

Water Level

The fluctuation of the water in Center Lake is so slight that no changes are necessary.

INSTITUTE FOR FISHERIES RESEARCH

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